

Citation:

Barr SI. Increased dairy product or calcium intake: is body weight or composition affected in humans? J Nutr. 2003 Jan;133(1):245S-248S.

PubMed ID: [12514301](#)

Study Design:

Systematic Review

Class:

M - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess the possible impact of increased intakes of dairy products or calcium on body weight or composition, a MEDLINE search was conducted to identify randomized trials of supplementation with calcium or dairy products.

Inclusion Criteria:

- studies published in the English language
- conducted with humans
- provided information on relative changes in body weight or composition

Exclusion Criteria:

Exclusion criteria was not delineated.

Description of Study Protocol:**Recruitment**

- A MEDLINE search was conducted between the years 1966 and October 2001 in which articles containing the exploded search terms, “calcium,” “calcium citrate,” “calcium, dietary,” “calcium carbonate” or dairy products were combined with those in which the search term “bone density,” “body weight” or “ body composition ” were a focus of the article.
- The combined sets were limited to studies published in the English language and conducted with humans
- Titles of the resulting 1090 articles were reviewed manually, and 30 randomized controlled trials of increased dairy products or calcium intake in generally healthy individuals were

identified

- Twenty articles provided information on relative changes in body weight or composition
- When email addresses could be obtained for authors of the remaining papers, they were contacted and asked to indicate whether differential changes in body weight or composition were observed between groups.

Design

Systematic Review

Blinding used (if applicable)

Intervention (if applicable)

Statistical Analysis

Data Collection Summary:

Timing of Measurements

Dependent Variables

- Body weight
- Body fat

Independent Variables

- Dairy products intake
- Calcium supplement intake

Control Variables

- Age
- Sex

Description of Actual Data Sample:

Initial N: 9 randomized studies on dairy product consumption; 17 randomized studies on effect of calcium supplementation.

Attrition (final N): Same 17 studies

Age:

Ethnicity:

Other relevant demographics:

Anthropometrics (e.g., were groups same or different on important measures)

Location:

Summary of Results:

Key Findings

- Nine studies of increased dairy product intake were identified. In seven, no significant differences in the change in body weight or composition were detected between the treatment and control groups. Two studies conducted in older adults observed significantly greater weight gain in the dairy product groups.
- The interpretation of these findings was complicated by the inability to accurately determine the extent of dietary compensation for the increment in energy intake provided by the added dairy products.
- In 17 calcium supplemented groups, only one study found greater weight loss in the supplemented group; in the remaining studies, changes in body weight and/or body fat were strikingly similar between groups

Table 1: Randomized trials of increased dairy product consumption

Author	Subjects	Design	Results
Chan(10)	48 U.S. girls initially 11 y old	1-y randomized trial of dairy product supplementation(to total 1200 mg/d)vs. usual diet	Wt gain: controls +7.2 kg; dairy+6.4 kg. Ht gain: controls +7.4 cm, dairy +7.8 cm. Fat gain: controls + 2.62 kg; dairy +2.59 kg. Lean gain: controls: 3.8 kg; dairy + 4.3 kg. All comparisons not significant (NS).
Cadogan(11)	82 British girls initially 12.2 y old	18-mo randomized trial of addition of 568 ml/d milk vs. usual diet	Wt gain: controls +7.2 kg; dairy+8.0 kg. Ht gain: controls +8.4 cm, dairy +9.1 cm. Fat gain: controls + 1.8 kg; dairy +1.9 kg. Lean gain: controls: 5.2 kg; dairy + 5.6 kg. All comparisons NS(absolute data approximated from graph showing % changes).

Merrilees(12)	91 New Zealand girls, initially age 15-16	2-y randomized trial of dairy foods(1000 mg Ca/d)or usual diet	Wt gain controls + 4kg; dairy+4.6 kg. Ht gain: controls +1.6 cm, dairy +1.3 cm. Fat gain: controls + 2556 g; dairy +2616 g. Lean gain: controls + 121 g; dairy + 720g. All comparisons NS.
Baran(13)	37 U.S. women aged 30-42 y	3-y randomized trial of increased dietary calcium (+610 mg/d) vs. usual diet	Wt gain: controls +3.4 kg; dairy+ 4.2(significance not reported).
Prince(14), Devine(15)	168 Australian women,>10y postmenopause	2-y randomized trial of 1)placebo, 2)milk powder(1g Ca/d), 3)Ca tablets(1g/d), 4)Ca tablets + exercise	No significant changes in BMI during the intervention in either the milk-powder group or the Ca tablet group (raw data not reported). Changes in BMI not reported for placebo group or Ca tablet plus exercise group.
Storm(16)	60 U.S. women > 65 y	2-y randomized trial of addition of milk(~250 mL/d),1g/d), 1g CaCO ₃ or placebo	No significant differences in change in weight or body composition among treatment groups(Rosen, C.J., personal communication, March 2002).
Lau(17)	185 Chinese women aged 55-59, >5 y	2-y randomized of addition of 50 g/d high calcium, low fat milk powder	Wt gain: controls -0.26 kg; dairy+0.52 kg (P<0.001). Fat change: controls -0.14 kg; dairy +0.42 kg. Lean change: controls: +0.2 kg; dairy + 0.3 kg.
Barr(18)	200 U.S. adults aged 55-85(129 women, 71 men)	12-wk randomized trial of the addition of ~2 cups/d low fat milk vs. usual	Wt gain (women)controls +0.4 kg; dairy+1.9 kg, (men): controls +1.0 kg; dairy +1.6 kg. Gain was

		diet.	significantly greater in dairy group (P<0.005).
Cleghorn(19)	115 Australian women, <5 y postmenopause	2-y, open crossover of 3 L /wk. Ca fortified milk(1y on milk, 1 y off)	Wt change:0.06 kg difference between on/off added dairy products(95% CI:-0.71 to 0.83 kg, NS).

Table 2: Effect of calcium supplementation on change in body weight and composition in randomized, placebo-controlled trials

Author	Subjects	Study design	Results
Dibba(22)	80 boys and 80 girls aged 8.3-11.9 y in rural Gambia	1-y trial of 1000 mg (5 d/wk) CaCO ₃ vs. placebo	No significant differences between groups in gains in wt, ht, triceps skinfold thickness, and mid-upper arm circumference.
Johnston(23)	45 pairs of identical U.S. twins aged 6-14 y.	3-y trial of 1000 mg/d calcium citrate malate	Increase in wt and ht similar in both those receiving calcium and those receiving placebo.
Lee(24)	84 Hong Kong children aged 7 y	18-mo trial of 800 mg/d CaCO ₃	Calcium and placebo groups had similar gains in wt(24.4 vs. 25.6%, P=0.46) and ht (8.4 vs. 8.4%, P=0.92).
Lee(25)	162 Chinese children aged 7 y	18-mo trial 300 mg/d CaCO ₃	Calcium and placebo groups had similar gains in wt(17.2 vs. 17.4%) and ht (7.2 vs. 7.2%).
Lloyd(26)	94 American girls aged 11.9 y	18-mo trial of 500 mg/d calcium citrate maltate	Calcium and placebo groups had similar gains in wt(P=0.53) , ht (P=0.86), BMI(P=0.80) and body fat % (P=0.86).
Bonjour(27)	149 Swiss girls aged 7.9 y	1-y trial of food products with CA ⁺⁺ (850 mg/d) from milk extracts or	Calcium and placebo groups had similar gains in ht (5.4 vs. 5.0 cm), wt (3.4 vs. 3.7 kg) and BMI (0.6 vs.

		placebo	0.8 kg/m ²).
Nowson(28)	42 female Australia twin pairs 10-17 y	18-mo trial of 1000 mg/d CaCO ₃ /Ca lactate gluconate vs. placebo	Calcium and placebo groups had similar gains in wt(~8 vs. ~ 7.9 kg)and ht(~7.3 vs. ~7.8 cm).
Riggs(34)	236 postmenopausal American women	4-y trial of 1600 mg/d ca citrate or placebo	Calcium and placebo groups had similar changes in wt(P=0.47) , and fat mass(P=0.59), but lean body mass was lower in the calcium group(P=0.006) (Riggs, B.L., unpublished results , personal communication, April 2002).
Ricci(29)	31 postmenopausal American women with BMI 28-42 kg/m ²	6-mo weight loss program , subjects randomized to 1 g/d calcium citrate malate or placebo	Calcium and placebo groups had similar changes in wt (-9.0 vs. -8.8 kg), BMI- 3.3 vs.-3.3 kg/m ²), fat mass(-7.3 vs. -7.3 kg) and lean mass (-1.0 vs. 0.7 kg).
Storm(16)	60 postmenopausal American women	2-yr trial of 1g/d CaCO ₃ , ~250 mL/d milk or placebo	Calcium and placebo groups had similar changes in wt and BMI(Rose, C.J., unpublished results, personal communication, March 2002).
Dawson-Hughes(35)	176 men and 213 women aged ≥65 y	3-y trial of 500 mg/d calcium plus 700 iu/d vitamin D, or placebo	Calcium/vitamin D and placebo groups had similar changes in wt and body composition (Dawson-Hughes, B., unpublished results, personal communication, March 2002).

Recker(30), Davies(3)	197 postmenopausal women >60 y	~4.3 y trial of 1200 mg/d CaCO ₃ or placebo	Calcium group lost more wt than the placebo group (-0.67 vs. -0.32 kg/y, P<0.025).
Perez-Jaraiz(31)	98 postmenopausal Spanish women with rapid bone loss	1-y open trial of 1 g/d calcium, hormone treatment, eelcatonin or control	No significant change in body wt in either the calcium or the control group(wt was also unchanged in the eelcatonin and hormone treatment groups).
Kalkwart(36)	327 American women studied during lactation and weaning	6-mo trial of 1g/d CaCO ₃ vs. placebo	Calcium and placebo groups had similar weight loss during lactation (-2.34 vs. -2.66 kg, P=0.57) and weaning (-0.54 vs. 0.46 kg, P=0.84)(Kalkwarf, H., unpublished results, personal communication, March 2002.
Prentice(37)	60 Gambian women studied during lactation	12-mo trial of ~700mg/d calcium vs. placebo	Calcium and placebo groups lost similar amounts of weight during the 1-y study (-1.2 vs. -0.9kg). There was no effect of supplement group on change in wt (P=0.85) (Prentice, A. & Jarjou, L.M.A., unpublished results, personal communication, April 2002).
Elders(32)	214 perimenopausal Dutch women	3-y trial of supplementation with 1g/d calcium, 2g/d calcium or no calcium	Changes in wt, ht and BMI were similar among the three treatment groups. On average, subjects gained 1.8 kg wt, lost

			0.2 cm height and increased BMI by 0.4 kg/m ² .
Jensen (33)	52 obese Danish women (14 menopausal)	3-mo trial of supplementation with 1 g/d calcium during 4.2 MJ wt loss diet	During the 3 mo of calcium supplementation and wt loss, the calcium group and untreated controls groups lost similar amounts of wt (5.7 and 6.6%, respectively).

Author Conclusion:

- The data available from randomized trials of dairy products or calcium supplementation provides little support for an effort in reducing body weight or fat mass.
- Questions that remain to be addressed include the following: 1) Is there a meaningful effect of calcium and/or other dairy components on body energy utilization and weight regulation in humans?; 2) If the effect exists, is it observed consistently or is there a susceptible subset for whom it is effective?; 3) How much calcium/dairy product intake is required?; and 4) What is the likely impact at the population level?

Reviewer Comments:

- *Limitation*
- *The studies reviewed were not specifically designed or powered to address this issue, such studies are required.*
- *The approach of the review did not capture all available data on the topic.*

The limitations and critique of the study, as stated by the authors appear to be very appropriate.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

- | | | |
|----|---|-----|
| 1. | Will the answer if true, have a direct bearing on the health of patients? | Yes |
| 2. | Is the outcome or topic something that patients/clients/population groups would care about? | Yes |
| 3. | Is the problem addressed in the review one that is relevant to nutrition or dietetics practice? | Yes |
| 4. | Will the information, if true, require a change in practice? | Yes |

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	???
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	???
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described?	No
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	???

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